(FILE 'USPAT' ENTERED AT 16:48:24 ON 17 FEB 1999)
L1 1497 S (PLEAT#### OR CORRUGAT####)(2A)FILTER
L2 42 S (ADVANTAGE OR BENEFIT)(20A)L1

=> d 17 19 26 cit hit

17. 5,250,179, Oct. 5, 1993, Compactable filter and compactable filter mounting means; Michael R. Spearman, 210/315, 317, 450, 484, 489, 493.2, 497.01 [IMAGE AVAILABLE]

US PAT NO: 5,250,179 [IMAGE AVAILABLE] L2: 17 of 42

SUMMARY:

BSUM(4)

The concept of fluid filter cartridges, and more particularly cylindrical fluid filter cartridges for filtering fluids, is well known in the art. In general the cartridges contain a cylindrical outer support member, a pair of end caps, a filter media, an inner support core and an external screen. In distinction to bag-type filters, the filter cartridge retains its cylindrical shape so that the cartridge can be installed directly into a cylindrical housing. One of the **advantages** of filter cartridges is that the walls of the filter cartridge can be made with a **pleated filter** media. The **pleated filter** media has a large surface area for filtering material from the fluid. In contrast, bag-type filters have less given surface area for the same given size since they do not contain pleated sidewalls. The bag-type filters generally have been used in applications where disposal is a problem. That is, the bags are usually made of flexible material and occupy less disposal space than a filter cartridge since the filter cartridge includes an interior or exterior support screen that precludes the filter cartridge from being readily compacted for disposable. The present invention provides improvement to prior art filter cartridges by providing a compactable non resilient filter cartridge that contains no inner support core or external support screen. A combination of the lack of an inner support core and the use of crushable materials in the end housing and the filter material permits the filter cartridge to be compacted and thus less costly to dispose of.

19. 5,232,595, Aug. 3, 1993, Deep bed filter, method of manufacture of a filter layer and a filter module; Karl-Otto Meyer, 210/493.1; 55/524; 95/285; 210/483, 496, 500.26, 509 [IMAGE AVAILABLE]

US PAT NO: 5,232,595 [IMAGE AVAILABLE] L2: 19 of 42

SUMMARY:

BSUM(4)

It is already known that **pleated filter** papers and **pleated** membrane **filters** are also used mainly as air filters in the most varied forms. The **advantages** of large filter surfaces within the smallest of spaces, as well as low flow speeds as a result of the large filter surfaces, are obvious.

SUMMARY:

BSUM(11)

A module with **pleated filter** layers avoids these disadvantages. A further **advantage** is that a larger effective filter surface is able to be accommodated in the case of a module with **pleated filter** layers when compared with a lenticular module, when considering units with the same module volume.

26. 4,876,007, Oct. 24, 1989, Plate-type filter cartridge with internal support; Kyoichi Naruo, et al., 210/339; 55/492; 210/346, 486, 488, 497.2 [IMAGE AVAILABLE]

US PAT NO: 4,876,007 [IMAGE AVAILABLE] L2: 26 of 42

SUMMARY:

BSUM(5)

Heretofore, there has been widely used a pleat-type filter cartridge having a microporous filtration membrane. This filter cartridge is formed in such a manner that the microporous filtration membrane is creased so as to be shaped like pleats. A cylindrical filtration membrane structure having a height in the direction of the pleats is disposed in a parallel arrangement. The inside and outside of the cylindrical filtration membrane structure are protected by plastic members. Other plastic members are stuck to the ends of the cylindrical filtration membrane structure to be sealed to the membrane structure. The **pleat**-type **filter** cartridge has an **advantage** in that the area of the filtration membrane within a unit volume (effective filtration area) can be increased to thereby attain an enormous filtration flow rate per unit time. Therefore, the pleat-type filter cartridge is useful for large-scale filtration in the field of the aforementioned industries or in laboratories.

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      (FILE 'USPAT' ENTERED AT 13:30:08 ON 17 FEB 1999)
L1          7601 S (DRAWN OR STRETCH###)(2A)(FIBER OR FIBRE OR FIBROUS)
L2           557 S (UNDRAWN OR UNSTRETCH##)(2A)(FIBER OR FIBRE OR FIBROUS)
                 SET HIGH OFF
L3        108598 S FILTER####/TI,AB,CLM
                 SET HIGH ON
L4           209 S L1 (P) L2
L5            14 S L3 AND L4

=> d 1-
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1. 5,708,740, Jan. 13, 1998, Optical notch filter manufacture in optical fibre waveguide by plastic deformation; Thomas John Cullen, 385/39 [IMAGE AVAILABLE]

2. 5,681,656, Oct. 28, 1997, Polyamide-imide fibers for a bag filter; Chuji Inukai, et al., 428/364, 365, 394 [IMAGE AVAILABLE]

3. 5,336,556, Aug. 9, 1994, Heat resistant nonwoven fabric and process for producing same; Makoto Yoshida, et al., 442/414; 156/296, 308.2; 428/212, 902 [IMAGE AVAILABLE]

4. 5,266,680, Nov. 30, 1993, Process for the preparation of poly(arylene sulfide) compositions; Jerry O. Reed, 528/388; 428/411.1, 419; 528/488, 489, 499 [IMAGE AVAILABLE]

5. 4,964,991, Oct. 23, 1990, Flat permeable membrane and for manufacture thereof; Yukio Seita, et al., 210/500.36, 654; 264/49 [IMAGE AVAILABLE]

6. 4,927,576, May 22, 1990, Method for the manufacture of flat permeable membrane; Yukio Seita, et al., 264/49; 210/500.36; 264/210.6, 211.19, 216, 234 [IMAGE AVAILABLE]

7. 4,900,444, Feb. 13, 1990, A porous membrane for blood components and method for manufacturing thereof; Yukio Seita, et al., 210/500.36; 264/41 [IMAGE AVAILABLE]

8. 4,743,375, May 10, 1988, Flat permeable membrane; Yukio Seita, et al., 210/500.36, 654; 264/41; 428/516, 523 [IMAGE AVAILABLE]

9. 4,530,809, Jul. 23, 1985, Process for making microporous polyethylene hollow fibers; Mizuo Shindo, et al., 264/210.7, 235, 288.8, 346; 428/376, 398 [IMAGE AVAILABLE]

10. 4,496,583, Jan. 29, 1985, Paper-like polyester fiber sheet and process for producing the same; Tamio Yamamoto, et al., 442/414; 162/157.3; 428/26, 904.4; 442/415 [IMAGE AVAILABLE]

11. 4,401,567, Aug. 30, 1983, Microporous polyethylene hollow fibers; Mizuo Shindo, et al., 210/500.22, 500.23, 500.36; 264/41, 209.1, 561; 428/376, 398 [IMAGE AVAILABLE]

12. 4,261,373, Apr. 14, 1981, Tobacco filters and method for forming same; Akimichi Tamaoki, et al., 131/332, 340, 344; 156/180; 493/43 [IMAGE AVAILABLE]

13. 4,173,504, Nov. 6, 1979, Method for producing tobacco filters;

Susumu Tomioka, et al., 156/180; 131/341, 343; 156/296 [IMAGE AVAILABLE]

14. 4,081,430, Mar. 28, 1978, Aromatic polyamide crystalline complex and the method for producing the same; Shunsuke Minami, et al., 528/348; 525/420, 432; 528/487, 492 [IMAGE AVAILABLE]

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US PAT NO: 5,336,556 [IMAGE AVAILABLE] L5: 3 of 14

DETDESC:

DETD(8)

Although the polyphenylenesulfide **fibers** may be **undrawn** **fibers** or **drawn fibers**, preferably the fibers have a heat shrinkage at 250.degree. C. (hereinafter referred to as S.sub.250) of 15% or less and. . .

US PAT NO: 4,496,583 [IMAGE AVAILABLE] L5: 10 of 14

SUMMARY:

BSUM(8)

U.S. Pat. No. 2,836,576 and Japanese Patent Application Publication No. 49-8809(1974) disclose a polyester fiber sheet in which **undrawn** polyester **fibers** are used as a binding material for **drawn** polyester **fibers**. Also, Japanese Patent Application Publication No. 51-2542(1976) discloses a polyester fiber sheet in which **undrawn** polyester **fibers** are used for the purpose of enhancing the tear strength of the sheet. However, the above-mentioned polyester fiber sheets exhibited. . .

SUMMARY:

BSUM(20)

Also, the polyester staple fibers may consist of a blend of **undrawn** polyester **fibers** with **drawn** polyester **fibers**.

SUMMARY:

BSUM(21)

In . . . the polyester staple fibers may consist of 20% by weight or more, preferably, from 30 to 90% by weight, of **undrawn** polyester staple **fibers** and the balance consisting of the **drawn** polyester staple **fibers**. Also, it is preferable that the individual **undrawn** polyester staple **fibers** have a denier of 1.3 or less, more preferably, 0.9 or less, and a length of 1 to 15 mm. The **undrawn** polyester staple **fibers** may have substantially no crimp or may have 20 crimps or less per 25 mm of the fiber:

SUMMARY:

BSUM(39)

In the process of the present invention, the polyester staple **fibers** may contain **undrawn** polyester staple **fibers** preferably having a denier of 1.3 or less, more preferably, 0.9 or less, a length of 0.3 to 20 mm, more preferably, 1 to 15 mm. Usually, it is preferable that the **undrawn** polyester **fibers** have a birefringence of from 0.01 to 0.06 and a specific gravity of 1.35 or less, while the **drawn**

polyester **fibers** exhibit a birefringence of from 0.12 to 0.26 and a specific gravity of from 1.37 to 1.40. Usually **undrawn** polyester staple **fibers** are used in an amount of 20% by weight or more, preferably, 30 to 90% by weight, more preferably, 40. . .

DETDESC:

DETD(39)

Equivalent amounts of the **drawn** cut **fibers** and the **undrawn** cut **fibers** were suspended in a concentration of 0.5% by weight in water. In this procedure, 0.01 g/l of a thickener consisting. . .

DETDESC:

DETD(42)

TABLE 4

Example No.	**Undrawn fiber** Birefringence	**Drawn fiber** Denier (.DELTA.n)	Paper-like sheet Frequency in breakage of sheet during paper-making procedure	Tensile strength (kg/15 mm)	Volume sistance (Times/60 min)	air flow re- Touch. . .

DETDESC:

DETD(43)

Table 4 clearly shows that when the **undrawn** polyester **fibers** are mixed with the **drawn** polyester **fibers** having a denier of 0.9 or less, the resultant paper-like sheets exhibit satisfactory properties. Also, the mixture of the **drawn fibers** and the **undrawn fibers** could be uniformly dispersed in water and exhibited a good paper-forming property.

DETDESC:

DETD(47)

The **drawn** cut **fibers** were mixed with the **undrawn** cut **fibers** in a mixing ratio of 1:1 and the mixture was suspended in a concentration of 0.5% by weight in water.. . . of about 70.degree. C., was added in an amount of 10% based on the total weight of the undrawn and **drawn** cut **fibers**, into the cut fiber suspension. Also, 0.01 g/l of a thickener consisting of a polyacrylamide were added to the cut. . .

DETDESC:

DETD(52)

The **undrawn** cut **fibers** were mixed with the same **drawn** cut **fibers** as those described in Example 24 in a mixing ratio as indicated in Table 6. The mixture was subjected to. . .

DETDESC:

DETD(54)

TABLE 6

Example No.	Mixing ratio (%) **undrawn fibers**/ **drawn fibers**	Paper-like sheet: Frequency in breakage of sheet during paper-forming procedure (Times/60 min)	Paper-like sheet: Tensile strength (kg/15 mm)	Paper-like sheet: Volume resistance fraction. . .	Coefficient of air flow

CLAIMS:

CLMS(4)

4. A sheet as claimed in claim 1, wherein said polyester staple fibers consist essentially of a blend of **undrawn** polyester staple **fibers** and **drawn** polyester staple **fibers**.

US PAT NO: 4,081,430 [IMAGE AVAILABLE] L5: 14 of 14

DETDESC:

DETD(7)

The . . . places hereinafter) used is not especially limited in its form and can be used in any forms such as powders, **undrawn** or **drawn fibers**, films or resins. The degree of polymerization of the polymers is also not especially limited, but those of 1.5 -. . .

DETDESC:

DETD(69)

The . . . C. L/D of the nozzle was 5. The extruded fibers were taken up at a velocity of 200 m/min. The **undrawn fibers** were fed into a washing bath of 3 m length at 20 m/min and drawn to 1.5 time by a. . . through a drying roller at 150.degree. C and drawn to 2 times on a hot plate of 320.degree. C. The **fibers** thus **drawn** by totally 3 times had good appearance and luster and properties of the fibers were as follows:

DETDESC:

DETD(80)

The same polymer as used in Example 7 was dry spun. **Undrawn fibers** (sample A) washed in boiling water and **drawn fibers** (sample B) **drawn** to 4.0 times in boiling water were prepared from dry

spun fibers. Each of sample A and sample B was. .

DETDESC:

DETD(82)

. . .

Tensile crystalline complex	Elong-weight (g/m.sup.2)	strength (kg/50 mm)	gation (%)
Partial complex of **drawn fibers**	35	12.3	13
Complete complex of **drawn fibers**	35	11.5	11
Complex of **undrawn** fibers	35	10.5	10

DETDESC:

DETD(117)

The . . . solution was dry spun by the usual method. The resultant fibers were washed in boiling water and dried to obtain **undrawn fibers**, which had a strength of 0.8 g/d, an elongation of 230% and a density of 1.345 g/cm.sup.3. Said **undrawn fibers** were **drawn** to 3.6 times in hot water of 80.degree. C and then dry heat treated on a hot plate of 250.degree.. : .

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     (FILE 'USPAT' ENTERED AT 13:30:08 ON 17 FEB 1999)
L1          7601 SEA PLU=ON  (DRAWN OR STRETCH###)(2A)(FIBER OR FIBRE OR FI
BRO
                 US)
L2           557 SEA PLU=ON  (UNDRAWN OR UNSTRETCH##)(2A)(FIBER OR FIBRE OR
 FI
                 BROUS)
                 SET HIGH OFF
L3        108598 SEA PLU=ON  FILTER####/TI,AB,CLM
                 SET HIGH ON
L4           209 SEA PLU=ON  L1 (P) L2
L5            14 SEA PLU=ON  L3 AND L4
L6           776 SEA PLU=ON  MEMBRANE (P) CORRUGAT####
L7           100 SEA PLU=ON  L3 AND L6
                 SET HIGH OFF
L8         31893 SEA PLU=ON  NON-WOVEN OR NONWOVEN
                 SET HIGH ON
L9            35 SEA PLU=ON  L7 AND L8
L10        17529 SEA PLU=ON  POLYESTER (2A) (FIBER OR FIBRE OR FIBROUS)
L11         4050 SEA PLU=ON  PAPER (15A) CORRUGAT#####
L12           72 SEA PLU=ON  L10 AND L11
L13           15 SEA PLU=ON  L3 AND L12
L14         1497 SEA PLU=ON  (PLEAT#### OR CORRUGAT####)(2A)FILTER
L15  DEL       9 S L10 (15A) L14
L15            9 SEA PLU=ON  L10 (25A) L14


     FILE USPAT
       * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
       *                  W E L C O M E   T O   T H E                *
       *          U. S.   P A T E N T   T E X T   F I L E            *
       * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

=> d 1- cit


1.  5,830,311, Nov. 3, 1998, Corrugating apparatus; David L. Braun, et
al., 156/471, 474 [IMAGE AVAILABLE]

2.  5,804,295, Sep. 8, 1998, Fibrous filtration face mask having
corrugated polymeric microfiber filter layer; David L. Braun, et al.,
428/323, 222, 325, 360, 365 [IMAGE AVAILABLE]

3.  5,772,738, Jun. 30, 1998, Multifunctional air filter and
air-circulating clean unit with the same incorporated therein; Hisashi
Muraoka, 96/129; 55/385.2, 486; 96/132, 135, 138, 151, 154 [IMAGE
AVAILABLE]

4.  5,763,078, Jun. 9, 1998, Filter having corrugated nonwoven webs of
polymeric microfiber; David L. Braun, et al., 428/175; 128/206.11,
206.16, 206.19; 428/35.8, 36.1, 365, 409 [IMAGE AVAILABLE]

5.  5,753,343, May 19, 1998, Corrugated nonwoven webs of polymeric
microfiber; David L. Braun, et al., 428/141; 210/493.1, 493.5, 494.1,
653; 428/903 [IMAGE AVAILABLE]
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6. 5,730,766, Mar. 24, 1998, Non-round unitary filter cartridge; Jack T. Clements, 55/341.1, 377, 379, 502, 507, 509, 521 [IMAGE AVAILABLE]

7. 5,656,368, Aug. 12, 1997, Fibrous filtration face mask having corrugated polymeric microfiber filter layer; David L. Braun, et al., 428/141; 128/206.12, 206.19, 206.21, 206.24, 206.28, 206.29; 210/493.1, 493.5, 494.1, 654; 428/903 [IMAGE AVAILABLE]

8. 5,639,700, Jun. 17, 1997, Thermal insulation containing corrugated nonwoven web of polymeric microfiber; David L. Braun, et al., 442/340; 428/113, 359, 362, 369; 442/352 [IMAGE AVAILABLE]

9. 5,620,545, Apr. 15, 1997, Method of making a corrugated nonwoven web of polymeric microfiber; David L. Braun, et al., 156/205, 210 [IMAGE AVAILABLE]

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US PAT NO: 5,830,311 [IMAGE AVAILABLE] L15: 1 of 9

SUMMARY:

BSUM(11)

U.S. . . . outer perforated, cylindrical support cage. The filter media may comprise organic melt blown microfibers. In Example 1, a composite, cylindrical **pleated filter** structure was prepared from two layers of melt-blown **polyester fibrous** material having two glass fiber layers sandwiched therebetween. The melt-blown **polyester fibrous** material contained fibers having diameters ranging from 35 to 50 .mu.m, and was calendared to a thickness of 0.009 inches. . .

US PAT NO: 5,804,295 [IMAGE AVAILABLE] L15: 2 of 9

SUMMARY:

BSUM(11)

U.S. . . . outer perforated, cylindrical support cage. The filter media may comprise organic melt blown microfibers. In Example 1, a composite, cylindrical **pleated filter** structure was prepared from two layers of melt-blown **polyester fibrous** material having two glass fiber layers sandwiched therebetween. The melt-blown **polyester fibrous** material contained fibers having diameters ranging from 35 to 50 .mu.m, and was calendared to a thickness of 0.009 inches. . .

US PAT NO: 5,772,738 [IMAGE AVAILABLE] L15: 3 of 9

SUMMARY:

BSUM(6)

A commercially available typical **pleat** type chemical **filter** module is one called DPCC (dry processed carbon composite) manufactured by EXTRACTION SYSTEMS INC. and made up of pleats of a sheet made of **polyester fibers** having a thickness of about 6 mm and containing activated carbon fine particles or activated carbon fine particles having an. . .

DETDESC:

DETD(10)

The pleated filter element 4 is fixed to the surrounding walls 3a, 3b, 3c, and 3d with no clearance between the **pleated filter** element 4 and the walls. As the element 4, a DPCC that is made of a **polyester fiber** sheet containing activated carbon fine particles made into relatively rigid pleats, is most preferable.

CLAIMS:

CLMS(3)

3. A multifunctional air filter module as claimed in claim 1, wherein

said **pleated** fabric **filter** element essentially consists of a rigid **polyester fi** sheet containing activated ca fine particles or a flexible unwoven fiber sheet containing activated carbon fine particles.

CLAIMS:

CLMS(7)

7. A multifunctional air filter module as claimed in claim 1, wherein said **pleated** fabric **filter** element essentially consists of a rigid **polyester fiber** sheet containing activated carbon fine particles or a flexible unwoven fiber sheet containing activated carbon fine particles, and said replaceable. . .

US PAT NO: 5,763,078 [IMAGE AVAILABLE] L15: 4 of 9

SUMMARY:

BSUM(11)

U.S. . . . outer perforated, cylindrical support cage. The filter media may comprise organic melt blown microfibers. In Example 1, a composite, cylindrical **pleated filter** structure was prepared from two layers of melt-blown **polyester fibrous** material having two glass fiber layers sandwiched therebetween. The melt-blown **polyester fibrous** material contained fibers having diameters ranging from 35 to 50 .mu.m, and was calendared to a thickness of 0.009 inches. . .

US PAT NO: 5,753,343 [IMAGE AVAILABLE] L15: 5 of 9

SUMMARY:

BSUM(11)

U.S. . . . outer perforated, cylindrical support cage. The filter media may comprise organic melt blown microfibers. In Example 1, a composite, cylindrical **pleated filter** structure was prepared from two layers of melt-blown **polyester fibrous** material having two glass fiber layers sandwiched therebetween. The melt-blown **polyester fibrous** material contained fibers having diameters ranging from 35 to 50 .mu.m, and was calendared to a thickness of 0.009 inches. . .

US PAT NO: 5,730,766 [IMAGE AVAILABLE] L15: 6 of 9

DETDESC:

DETD(11)

Pleated filter media 52 is a pleat pack formed of any suitable material. For instance, **pleated filter** media 52 may be constructed of **polyester**, polypropylene, Aramid **fibers**, such as Nomex.TM., PPS fibers, such as Ryton.TM., fiberglass, acrylic fibers or other suitable materials.

US PAT NO: 5,656,368 [IMAGE AVAILABLE] L15: 7 of 9

SUMMARY:

BSUM(11)

U.S. . . . perforated, cylindrical support cage. The filter media may comprise organic melt blown micro fibers. In Example 1, a composite, cylindrical **pleated filter** structure was prepared from two layers of melt-blown **polyester fibrous** material having two glass fiber

layers sandwiched therebetween. The melt-blown **polyester fibrous** material contained ers having diameters ranging [redacted] 35 to 50 .mu.m, and was calendared a thickness of 0.009 inches. . .

US PAT NO: 5,639,700 [IMAGE AVAILABLE] L15: 8 of 9

SUMMARY:

BSUM(11)

U.S. . . . outer perforated, cylindrical support cage. The filter media may comprise organic melt blown microfibers. In Example 1, a composite, cylindrical **pleated filter** structure was prepared from two layers of melt-blown **polyester fibrous** material having two glass fiber layers sandwiched therebetween. The melt-blown **polyester fibrous** material contained fibers having diameters ranging from 35 to 50 .mu.m, and was calendared to a thickness of 0.009 inches. . .

US PAT NO: 5,620,545 [IMAGE AVAILABLE] L15: 9 of 9

SUMMARY:

BSUM(11)

U.S. . . . outer perforated, cylindrical support cage. The filter media may comprise organic melt blown microfibers. In Example 1, a composite, cylindrical **pleated filter** structure was prepared from two layers of melt-blown **polyester fibrous** material having two glass fiber layers sandwiched therebetween. The melt-blown **polyester fibrous** material contained fibers having diameters ranging from 35 to 50 .mu.m, and was calendared to a thickness of 0.009 inches. . .